REMARKS/ARGUMENTS

Applicant has carefully reviewed and considered the Office Action mailed on August 31, 2006, and the references cited therewith.

Claims 1, 8-9, 13, 15-19, and 22-23 are amended, no claims are canceled, and no claims are added; as a result, claims 1-23 are now pending in this application.

Claim Objections

Claims 8, 9, 13, 18-19, and 22-23 were objected to because of the following informalities:

In claim 8, lines 6-7, "dereference a virtual address space for a process associated with a removable, memory mappable device connected to the computer device" should be "dereference a virtual address space for a process associated with a removable[,] memory mappable device connected to the computer device.

In claim 9, line 3, "an operating system the computing device" should be "an operating system of the computing device.

In claim 13, line 8 "a removable, memory mappable device associate with the process" should be "a removable[,] memory mappable device associate with the process".

In claim 18, line 3, "the virtual address space in not available for use" should be "the virtual address space [in] is not available for use".

In claim 19, lines 2-3, "dereferencing a memory address for a process associated with a removable, memory mappable device" should be "dereferencing a memory address for a process associated with a removable[,] memory mappable device".

In claim 22, lines 2-3, "a removable, memory mappable device connected to a computing device", should be "a removable[,] memory mappable device connected to a computing device".

In claim 23, lines 23-4, "dereferencing a virtual address space for a process associated with a removable, memory address device" should be "dereferencing a

virtual address space for a process associated with a removable[,] memory address device".

Applicant has addressed the above recommended changes and respectfully requests reconsideration and withdrawal of the objection to these claims.

§ 112 Rejection of the Claims

Claims 15-18 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Antecedent basis issues were identified by the Examiner and have been addressed by the Applicant in the amendments.

Applicant respectfully requests reconsideration and withdrawal of the 112 rejection these claims.

§ 102 Rejection of the Claims

Claims 1-9, 11-22, and 23 were rejected under 35 USC § 102(e) as being anticipated by Browning et al. (U.S. Publication No. 2004/0064669). Applicant does not admit that Browning is indeed prior art and reserves the right to swear behind the same at a later date. Nonetheless, Applicant believes the present claims are distinguishable from the Browning reference for at least the following reasons.

Applicant respectfully submits that the present Application addresses at least in part memory management for removable memory mappable devices, i.e., devices that can be disconnected from a computing device. When such an action occurs, a memory management system of an operating system will release the physical memory space associated with that particular device according to that operating systems semantics. A process associated with the device, however, may not have yet released the virtual memory address associated with that physical address.

The Browning reference does not appear to address removable memory devices. Indeed Browning appears to be concerned with pretranslations becoming invalidated upon physical address changes, e.g., when a real (physical) page is

migrated to a new real page, and <u>synchronizing</u> the invalidation process with the memory remove process. (Pp [0027]).

To this end, Browning lays forth in careful detail in Figure 9 and Pp[0061]-[0063] that memory migration and removal of real pages of memory are not removed until the kernel has received an acknowledgement of a sent interrupt from all CPUs and once received that all registered RPN lists have been scanned and all entries corresponding to real pages that are within the range of memory <u>to be removed</u> have been invalidated. This action is simply not possible in the case of removable devices where the semantics of the operating system operate to remove the physical pages associated with the removable device once the device has been disconnected albeit unknown to a process using a virtual memory address associated with that physical address.

In contrast to the Browning process of determining acknowledgement of interrupts and invalidation of relevant pretranslation lists prior to the migration and removal or real memory pages, Applicant's claims recite language covering the occurrence of physical memory page removal before the same is known to a process using that real memory.

For example, Applicant's independent claim 1, as amended, recites instructions which execute to:

> release a physical address space associated with the virtual address space when the device has a connection removed from the computing device; and
> register that the virtual address space, previously available to the process, is no longer valid for process use <u>after the physical address space is released and</u> before the process has released the virtual address space.

Applicant's independent claim 8, as amended, recites instructions which execute to:

> release a physical address space associated with the virtual address space when the device associated with the process is logically disconnected; and
> register in a virtual memory data structure of the memory management system that the virtual address space is no longer

available to the process <u>after the physical address space is released
and</u> when the process has not yet released the virtual address space.

Applicant's independent claim 13, recites in part:

means for unmapping a virtual address space for a process
in <u>a manner which does not violate semantics for an operating
system</u> of the computing device when <u>a removable memory
mappable device associated with the process is logically
disconnected</u>.

Applicant respectfully submits that the Browning reference does not contain
any mention of unmapping in relation to the semantics of an operating system or in
relation to removable memory mappable devices.

Further, Applicant's independent claim 19, as amended, recites a method
which includes:

removing the object from physical memory when the device
is logically disconnected from the computing device; and
providing an indication in the virtual memory data structure
that a virtual address space is no longer available for use by the
process, <u>after removing the object from physical memory,</u> without
removing the representation of the object from the virtual memory
data structure.

Applicant's independent claim 22, as amended, recites a method which
includes:

releasing a physical address space when the device has a
logical connection removed from the computing device; and
<u>after</u> releasing the physical address space and <u>before</u> the
process has released the virtual address space, registering that the
virtual address space is not available to the process in a manner
which does not violate semantics of an operating system.

Applicant's independent claim 23, as amended, recites a computer readable
medium having a program to cause a device to perform a method, comprising:

releasing a physical address space when the device is
logically disconnected from the computing device; and
<u>after</u> ~~upon~~ releasing the physical address space <u>and</u> before
the process has released the virtual address space, registering in a
virtual memory data structure associated with the process that the

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> virtual address space is no longer available to the process in a
> manner which does not violate semantics for an operating system
> the computing device.

As such, Applicant respectfully submits that each and every element and limitation as recited in independent claims 1, 8, 13, 19, 22, and 23 is not described in the Browning reference. Accordingly, the Browning reference does not support a 102 rejection of the above claims. Reconsideration and withdrawal of the 102 rejection for the above independent claims, as well as those claims which depend therefrom, is respectfully requested.

§103 Rejection of the Claims

Claim 10 was rejected under 35 USC § 103(a) as being unpatentable over Browning et al. (U.S. Publication No. 2004/0064669) in view of *Microsoft Computer dictionary Fifth edition*, and *On-line Computing Dictionary* (http://www.instantweb.com/foldox/foldoc.cgi?query=kernel&action=Search).

Claim 10 depends from independent claim 8. For the reasons provided above, Applicant respectfully submits that the Browning reference does not describe teach, or suggest each and every element and limitation of independent claim 8, as amended. The *Microsoft Computer dictionary Fifth edition*, and *On-line Computing Dictionary*(http://www.instantweb.com/foldox/foldoc.cgi?query=kernel&action=Se arch) do not cure the deficiencies with the Browning reference. That is the additional citations do not describe, teach, or suggest instructions which execute to:

> release a physical address space associated with the virtual
> address space when the device associated with the process is
> logically disconnected; and
> register in a virtual memory data structure of the memory
> management system that the virtual address space is no longer
> available to the process after the physical address space is released
> and when the process has not yet released the virtual address space.

As such, Applicant respectfully submits that the references do not, either independently or in combination, support a 103 rejection of independent claim 8 or claim 10, which depends therefrom. Accordingly, reconsideration and withdrawal of the 103 rejection of claim 10 is respectfully requested.
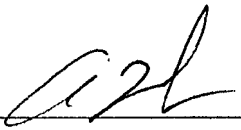
CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney Kevin Hart at (970) 898-7057 to facilitate prosecution of this matter.

At any time during the pendency of this application, please charge any additional fees or credit overpayment to the Deposit Account No. 08-2025.

Respectfully Submitted,
Manish K. Ahluwalia

By his Representatives,
BROOKS & CAMERON, PLLC
1221 Nicollet Avenue, Suite 500
Minneapolis, MN 55403

By: _[signature]_
Edward J. Brooks III
Reg. No. 40,925

Date: _10/3/2006_

MEMORY TRANSMISSION REPORT

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10-03-'06 12:05 FROM-Brooks & Cameron   612-659-9344   T-534 P01/15 U-084

HEWLETT-PACKARD COMPANY
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PATENT APPLICATION

ATTORNEY DOCKET NO. __200315854-1__

Inventor(s): Manish K. Ahluwalia
Application No.: 10/790,809
Filing Date: March 1, 2004

Confirmation No.: 1055
Examiner: Zhuo H. Li
Group Art Unit: 2185

Title: MEMORY MANAGEMENT

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Alexandria, VA 22313-1450

TRANSMITTAL LETTER FOR RESPONSE/AMENDMENT

Transmitted herewith is/are the following in the above-identified application:

- [X] Response/Amendment
- [ ] New fee as calculated below
- [X] No additional fee
- [ ] Other

- [ ] Petition to extend time to respond
- [ ] Supplemental Declaration

Fee$

CLAIMS AS AMENDED BY OTHER THAN A SMALL ENTITY						
(1) FOR	(2) CLAIMS REMAINING AFTER AMENDMENT	(3) NUMBER EXTRA	(4) HIGHEST NUMBER PREVIOUSLY PAID FOR	(5) PRESENT EXTRA	(6) RATE	(7) ADDITIONAL FEES
TOTAL CLAIMS		MINUS		= 0	X 350	$ 0
INDEP. CLAIMS		MINUS		- 0	X $200	$ 0
[ ] FIRST PRESENTATION OF A MULTIPLE DEPENDENT CLAIM					+ $360	$ 0
EXTENSION FEE	[ ] 1st Month $120	[ ] 2nd Month $450	[ ] 3rd Month $1020	[ ] 4th Month $1590		¢ 0
					OTHER FEES	$
				TOTAL ADDITIONAL FEE FOR THIS AMENDMENT		$ 0

Charge $ 0 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number (571) 273-8300.
Date of facsimile: 10/03/2006
Typed Name: Alison L. Subendran
Signature:

Respectfully submitted,
Manish K. Ahluwalia
By
Edward J. Brooks III
Attorney/Agent for Applicant(s)
Reg No.: 40,925
Date: 10/03/2006
Telephone: (612) 236-0120

Rev 1006 (TransAmtFax)

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10-03-'06 12:08 FROM-Brooks & Cameron   612-659-9344   T-535 P05/15 U-684

Application No. 10/790,509
Amendment dated October 3, 2006
Reply to Office Action of August 31, 2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A computing device, comprising:

    a processor;

    a memory coupled to the processor; and

    program instructions provided to the memory and executable by the processor to:

    track a virtual address space for a process associated with a device connected to the computing device;

    release a physical address space associated with the virtual address space when the device has a connection removed from the computing device; and

    register that the virtual address space, previously available to the process, is no longer valid for process use after the physical address space is released and before the process has released the virtual address space.

2. (Original) The computing device of claim 1, wherein the device includes a device which can be mapped to memory.

3. (Original) The computing device of claim 1, wherein the virtual address space includes an input/output space.

4. (Original) The computing device of claim 1, wherein the program instructions are part of a memory management system which includes a virtual memory data structure associated with the process.
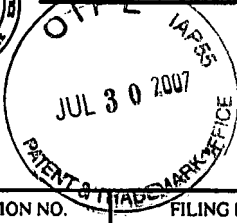
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,509	03/01/2004	Manish K. Ahluwalia	200315654-1	1055

22879   7590   05/16/2007
HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

EXAMINER
LI, ZHUO H

ART UNIT	PAPER NUMBER
2185	

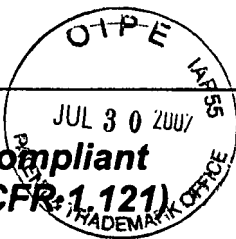| MAIL DATE	DELIVERY MODE
05/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of Non-Compliant Amendment (37 CFR 1.121)	**Application No.** 10/790,509	**Applicant(s)** AHLUWALIA, MANISH K.	
	Examiner Zhuo H. Li	**Art Unit** 2185	

JUL 3 0 2007

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

The amendment document filed on <u>03 October 2006</u> is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

☐ 1. Amendments to the specification:
    ☐ A. Amended paragraph(s) do not include markings.
    ☐ B. New paragraph(s) should not be underlined.
    ☐ C. Other _____.

☐ 2. Abstract:
    ☐ A. Not presented on a separate sheet. 37 CFR 1.72.
    ☐ B. Other _____.

☐ 3. Amendments to the drawings:
    ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet," "New Sheet," or "Annotated Sheet" as required by 37 CFR 1.121(d).
    ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required.
    ☐ C. Other _____.

☐ 4. Amendments to the claims:
    ☐ A. A complete listing of all of the claims is not present.
    ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
    ☐ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
    ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
    ☐ E. Other: _____.

☒ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4):
    <u>The newly filed amendment contains missing words or unable to read phases on both Claims and Remark sections via the fax transmission. A clear and fully submission is required from Applicant.</u>

For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period** if the non-compliant amendment is an after-final amendment or an amendment filed after allowance. If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.

2. Applicant is given **one month**, or thirty (30) days, whichever is longer, from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a *Quayle* action. If any of above boxes 1. to 4. are checked, the correction required is only the **corrected section** of the non-compliant amendment in compliance with 37 CFR 1.121.

    Extensions of time are available under 37 CFR 1.136(a) <u>only</u> if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.

    Failure to timely respond to this notice will result in:
        Abandonment of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or
        Non-entry of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

SANJIV SHAH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Legal Instruments Examiner (LIE), if applicable   Telephone No.